FORCEnet
engineering conference

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Integrated Network Management

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Communications and Networking Session

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SPAWARSYSCOM
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Session Theme: Communications Infrastructure

Fn technical vision (circa 2020): "Robust Multi-tiered communications architecture consisting of a robust space backbone, air backbone, LOS, and terrestrial backbone that is protected against all potential threats *commensurate with the operating environment and the criticality of the information being transported,* and shall ensure connectivity through the total threat environment (e.g. convertional and nuclear)." [1]

[1] FORCEnet M&S 2020 Technical Attribute

Network Management Goal

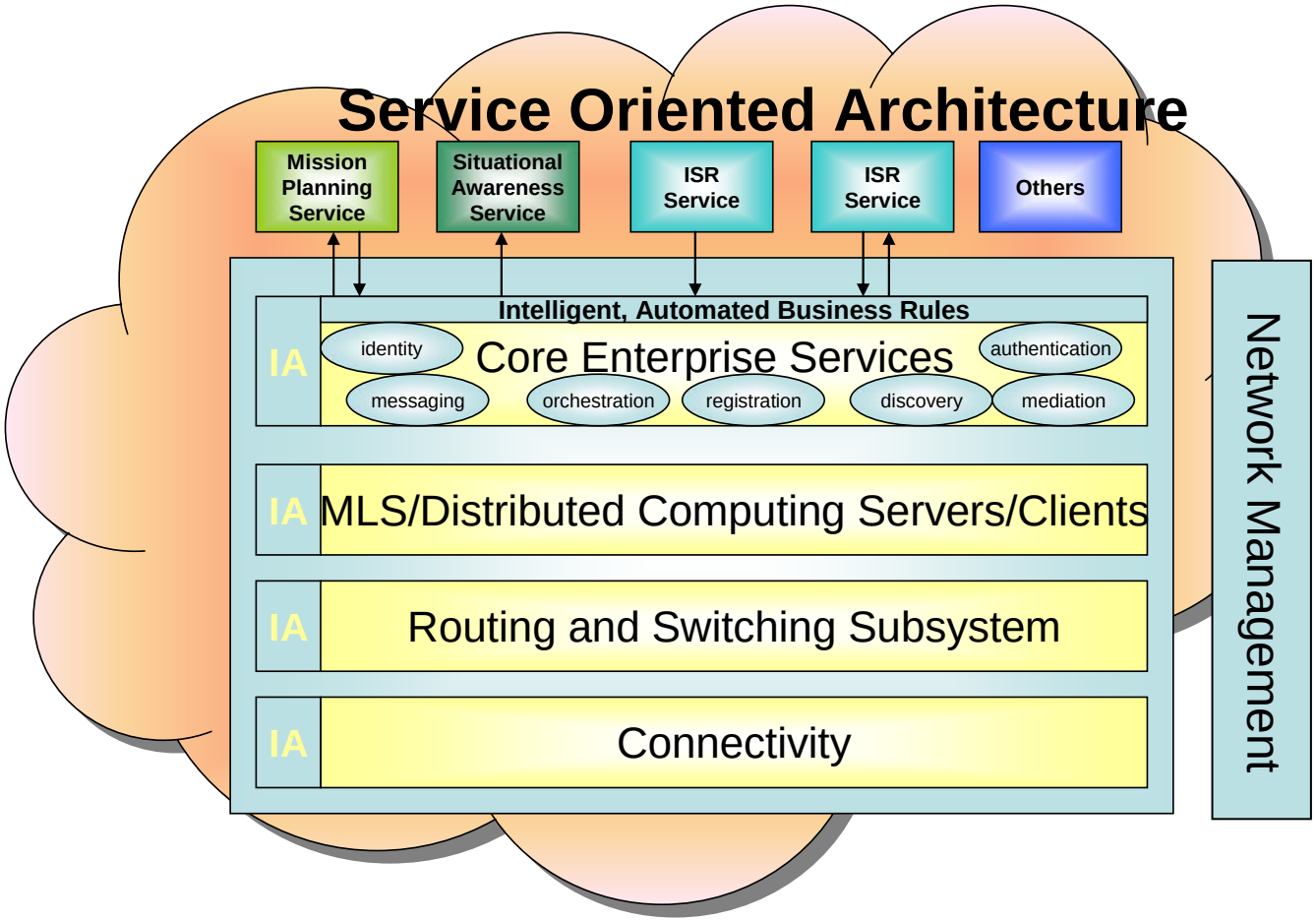
- Ensure communication resources are managed to support Operational Needs/Missions
  - Policy Based Network Management
  - Allow operational chain of command to drive Comms
  - Timely delivery of mission critical information

- Make Comms part of the Common Operational Picture (COP)

Some Traffic Management Techniques

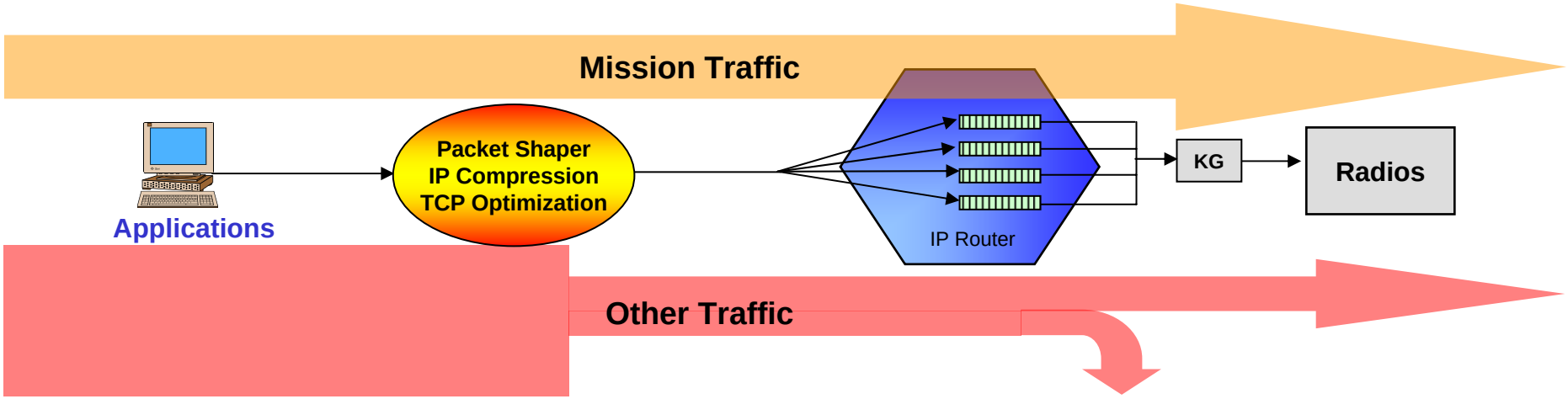
- Compression
  - information can be compressed to take up less space
- Caching
  - Storing frequently requested information close to the end user.
- Packet Shaping
  - prioritize mission critical applications.
- TCP Optimization
  - TCP optimization protocols significantly increase the data rate for TCP over Satcom.
- Prioritization
  - By user, time of day, application
- Differentiated Services
  - Provisioning local bandwidth to traffic classes

Network Management Protocol Architecture



- **Caching**
- **Compression**
- **Packet Shaping**
- **TCP Optimization**
- **IP QoS**
- **Channel Access/Bandwidth Sharing**
- **Capacity Allocation**

Bandwidth Management



Classify Data

- Does application traffic Support Mission?
- Mark Packet's DSCP
  - User
  - Application
  - Mission

Rate Control

- Limit rate of individual users or applications
- Goal: Constrain traffic outside of mission area from interfering with traffic supporting the mission

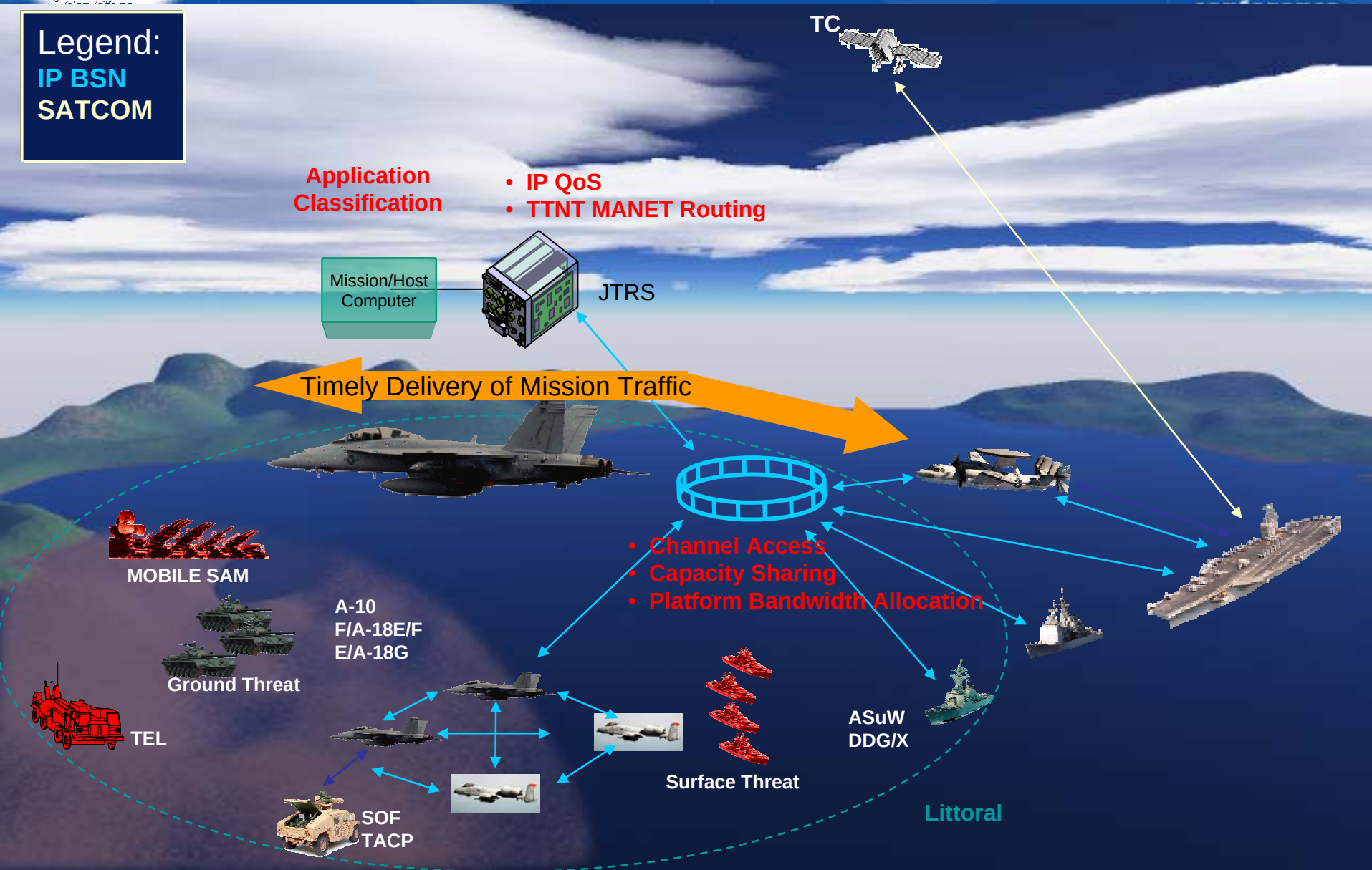
Router QoS

- Allocate bandwidth to traffic classes (DiffServ)
- Discard data within classes based on Priority
- Goal: Provision bandwidth to ensure mission traffic achieves performance requirements

Satellite Resources

- Control Bandwidth Allocation to Platforms

Battlespace Network (BSN) Network/Bandwidth Management



Integrated Autonomous Network Management
ONR FNC

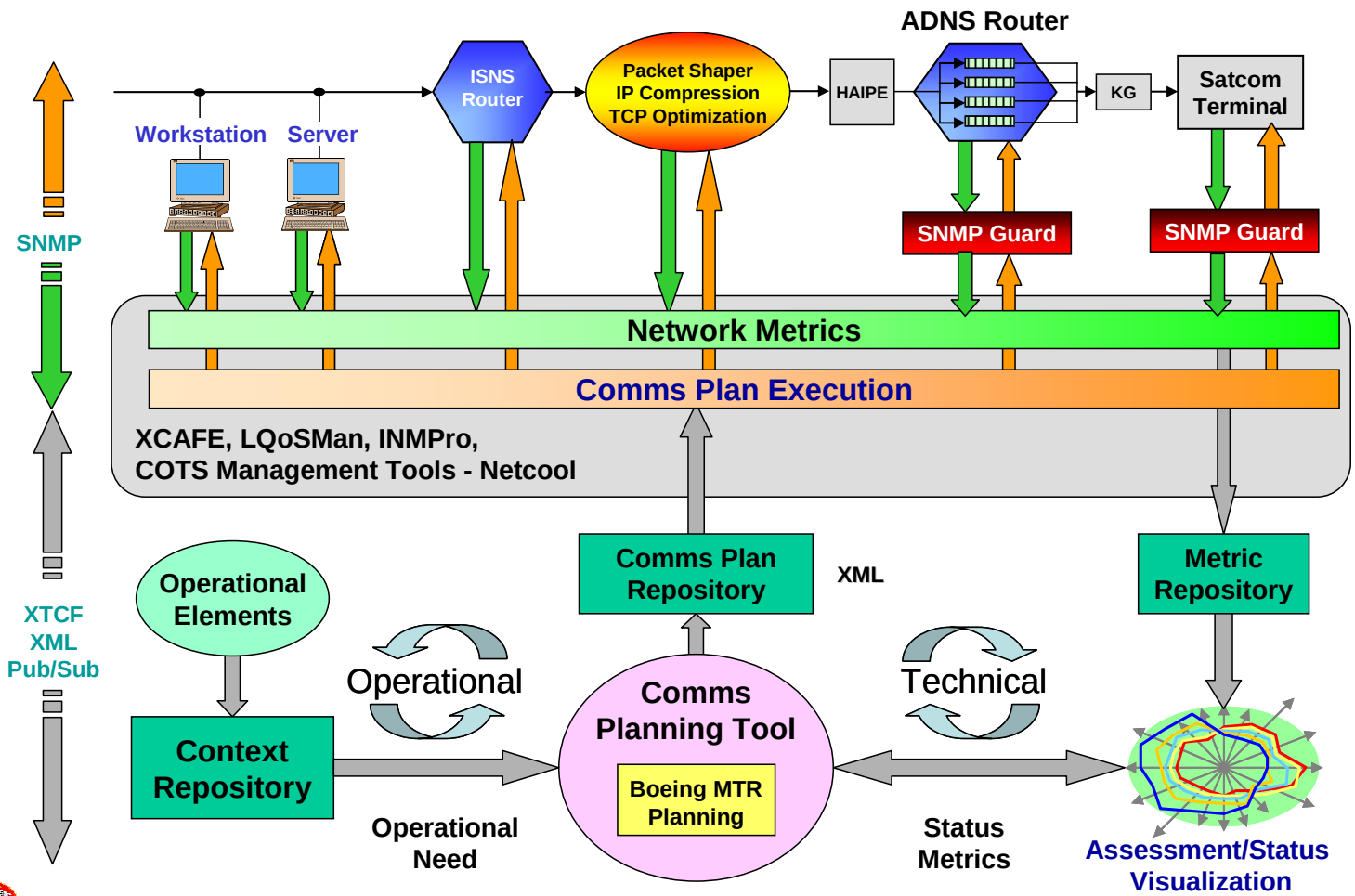
- What is the problem?
  - Communications planning is a manually intensive process
  - The resulting COMMPLANs are relatively static and non-responsive to a dynamic warfare environment

- The IANM solution
  - Transition communications resource management to a dynamically responsive automated Framework
  - Provide assured network readiness in support of Operational Commander's requirements
  - Provide the Commander a clear picture of how the network is supporting operational intent – a Network Common Operational Picture

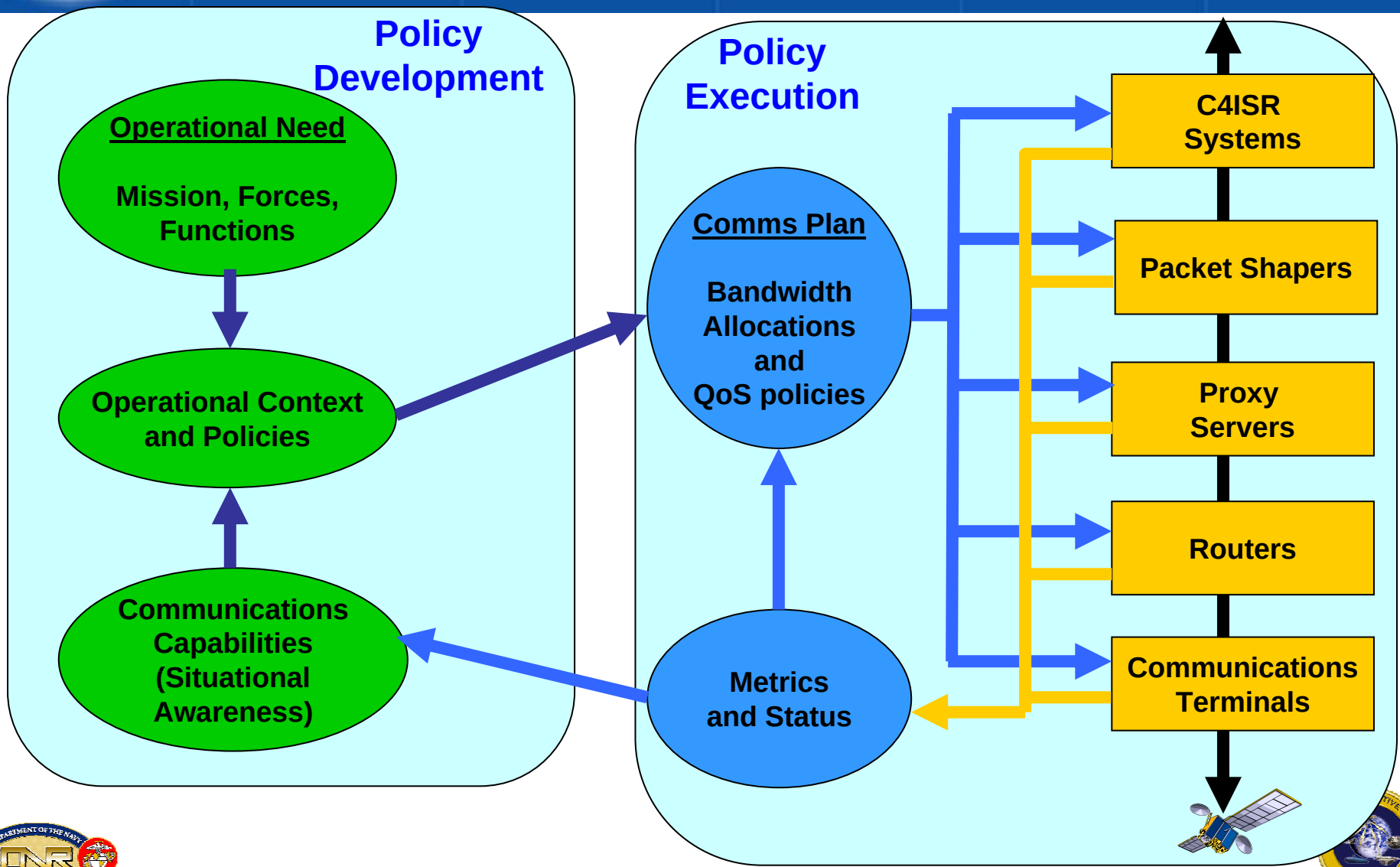
Provide enabling technologies to meet manning reductions such as those reflected in the CVN-21 and DDX ORDS by providing "…a real time capability to proactively manage networks in response to a commander's intent and emergent battlespace needs"

Integrated Autonomous Network Management (IANM) Shipboard Architecture

Service Oriented Architecture For Network Management



IANM Concept of Operations



Integrated Autonomous Network Management (IANM) Project Plan

FY05

- Use Case Development/Requirements Generation
- CONOPS definition
- Initial data and interface definition
- Architecture definition
- AoA of existing Naval/Joint Management Systems
- Initial capability prototyping

FY06

- Architecture validation
- Software design, code and integration testing
- Full Capability Prototyping

FY07

- Lab Demo
- At sea demo
- Publishing of PEO enterprise management & control framework for reference and use in acquisitions

Questions